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(71) Applicant *(for all designated States except US)*: RDM COR-PORATION [CA/CA]; 608 Weber Street North, Unit #4, Waterloo, Ontario N2V 1K4 (CA).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: WALLACE, William, E. [CA/CA]; 97 William Street West, Waterloo, Ontario N2L 1J6 (CA). AKISTER, Jim, F. [CA/CA]; 149 Belmont Avenue, Waterloo, Ontario N2L 2B2 (CA). PAVLIK, Patrick, C. [CA/CA]; 643 Waterbury Lane, Waterloo, Ontario N2V 2C4 (CA). FORDE, Peter, A. [CA/CA]; 11 Sugarbush Place, Guelph, Ontario N1H 7Z1 (CA). LOPIN, Pavel, I. [CA/CA]; 520 Parkside Drive, Apartment 5, Waterloo, Ontario N2L 5E3 (CA). XIONG, Wei [CA/CA]; 520 Parkside Drive, Apartment 213, Waterloo, Ontario N2L 5E3 (CA).

(74) Agents: GRAHAM, Robert, J. et al.; Gowling Lafleur Henderson L.L.P., Suite 4900, Commerce Court West, Toronto, Ontario M5L 1J3 (CA).

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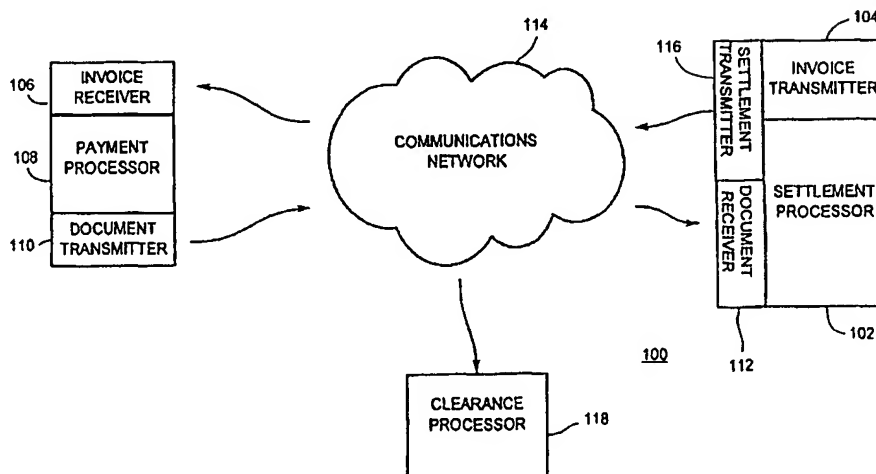
(57) Abstract

An electronic invoice payment system consists of a settlement processor, an electronic invoice transmitter, an electronic invoice receiver, and an electronic payment processor. The settlement processor generates an electronic invoice which specifies a settlement amount in accordance with a debt owed. The invoice transmitter is in communication with the settlement processor for electronically transmitting the invoice over a network. The invoice receiver is configured for receiving the transmitted electronic invoice over the network. The payment processor is in communication with the invoice receiver and provides an electronic financial instrument for payment of the received invoice. The payment processor derives the financial instrument in accordance with the settlement amount specified on the received invoice. The payment processor then transmits the financial instrument to the settlement processor for settlement of the instrument with a financial institution.

ELECTRONIC INVOICE PAYMENT SYSTEM

FIELD OF THE INVENTION

5   The present invention relates to an electronic funds transfer system. In particular, the present invention relates to a method and system for electronic invoice payment.

BACKGROUND OF THE INVENTION

10   Most often, consumers receive paper invoices by postal mail for goods and services they have purchased. The recipient consumer typically pays each institution for the goods and services purchased by issuing a paper cheque in the monetary sum specified in the paper invoice, and then mailing the paper cheque to the institution. Although this process is widely used, the process can be quite tedious, particularly

15   where the consumer must issue a number of paper cheques. Further, due to the delays inherent in the postal service process, the issuing institution might not receive the paper cheque in a timely manner. Also, the issuing institution must wait for the paper cheque to be cleared until payment is actually received, a process which can take several days.

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Attempts have been made to improve the invoice payment process. For instance, some institutions have established web sites through which consumer's can view their account status. The consumer can then pay the account by either mailing a paper cheque to the institution in the outstanding amount, or by entering financial

25   information, such as a credit card number and expiry date, authorizing payment of the outstanding amount. The former approach does not appreciably reduce the transaction time until payment is received, while the latter approach exposes the consumer to fraudulent use of sensitive financial information. Also, if the consumer has multiple outstanding accounts, the consumer must access each institution web site individually.

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Many banks have also established web sites or electronic banking terminals through which consumer's can pay outstanding accounts for goods and services provided by

other institutions. Although this approach is advantageous in that it reduces the
consumer's exposure to fraud, the approach does not appreciably reduce the
transaction time until payment is received since the invoice is typically provided to
the consumer by postal mail. Further, the enterprise invoices for which this service is

5   available is generally limited to credit card institutions and utilities. Alternately, a
service charge may be applicable for the payment of invoices generated from non-
preferred institutions. In addition, since the web site of the enterprise is a perfect
venue in which to advertise to the consumer other goods and services, this approach
deprives the enterprise of valuable exposure to the consumer.

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The Financial Services Technology Consortium (US 5,677,955) has developed an
electronic funds transfer instrument (electronic cheque) as a venue for electronic bill
payment. The electronic cheque is generated on a computer-based system, and
specifies the name of the recipient and the monetary sum to be paid to the recipient.

15   The electronic cheque also includes the bank account number of the payer and the
bank routing number of the payer's bank. The electronic cheque is then digitally
signed with the payer's private encryption key, and then transmitted electronically to
the recipient. The received electronic cheque is then digitally endorsed with the
recipient's digital signature and then transmitted electronically to the recipient's bank

20   for clearance. This approach is advantageous in that it limits the consumer's exposure
to fraud. However, as the invoice is provided to the consumer by postal mail, this
approach does not appreciably expedite the transfer of funds from the consumer to the
recipient institution. Further, the infrastructure for the processing of electronic checks
is not sufficiently well established to make widespread use of this approach

25   immediately viable.

Therefore, there remains a need for an electronic invoice payment system which
reduces the transaction time until payment is received, which ensures the security of
consumer's financial information, and which is not hindered by the limitations of the

30   existing electronic payment infrastructure. Also, there remains a need for an
electronic invoice payment system which provides payee institutions with a venue for
the provision of advertising to consumers.

SUMMARY OF THE INVENTION

According to the present invention, there is provided an electronic invoice payment system and method which addresses deficiencies of the prior art.

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The electronic invoice payment system, according to a first aspect of the present invention, facilitates invoice payment over a network, and includes a settlement processor, an electronic invoice transmitter, an electronic invoice receiver, and an electronic payment processor. The settlement processor generates an electronic

10   invoice in accordance with a debt owed. The invoice transmitter is in communication with the settlement processor for electronically transmitting the invoice over a network. The invoice receiver is configured for receiving the electronic invoice over the network. The payment processor is in communication with the invoice receiver and provides an electronic financial instrument for payment of the received invoice.

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The method of electronic invoice payment, according to the first aspect of the present invention, includes the steps of:

providing an electronic invoice for payment to a payment recipient, the invoice including a settlement amount;

20   transmitting the invoice to a recipient network location for receipt by a target recipient;

the target recipient deriving from the received invoice an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount; and

25   transmitting the financial instrument to a payment network location for settlement of the received invoice.

According to a second aspect of the present invention, there is provided an electronic invoice payment device for paying an electronic invoice over a network. The

30   electronic invoice payment device includes an electronic invoice receiver, an electronic payment processor, and a document transmitter. The invoice receiver is configured for receiving over the network from a payment recipient an electronic

invoice which includes a settlement amount. The payment processor is in communication with the invoice receiver and provides an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount. The document transmitter is in communication with the payment processor

5   and transmits the financial instrument over the network for affecting payment of the received invoice.

According to the second aspect of the present invention, there is also provided a method for paying an electronic invoice over a network, which includes the steps of:

10   receiving over a network from a payment recipient an electronic invoice for payment, the invoice including a settlement amount;

deriving from the received invoice an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount; and

transmitting over the network to the payment recipient the financial instrument

15 for settlement of the received invoice.

According to a third aspect of the present invention, there is provided an electronic payment receiving device for receiving payment over a network for an electronic invoice. The electronic payment receiving device includes an electronic invoice

20 transmitter, a document receiver, a settlement processor, and a document transmitter. The electronic invoice transmitter is configured for transmitting over the network to a target recipient an electronic invoice, the invoice including a settlement amount. The document receiver is provided to receive over the network from the target recipient an electronic financial instrument, the financial instrument including payment terms.

25 The settlement processor is in communication with the invoice transmitter and the document receiver, and provides the invoice transmitter with the invoice and correlates the received financial instrument with the transmitted invoice. The document transmitter is in communication with the settlement processor and transmits the correlated financial instrument to a financial institution for affecting payment of

30 the transmitted invoice.

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According to the third aspect of the present invention, there is also provided a method for obtaining payment over a network for an electronic invoice, which includes the steps of:

   transmitting over a network to a target recipient an electronic invoice for
5   payment, the invoice including a settlement amount;

          receiving over the network from the target recipient for settlement of the payment an electronic financial instrument, the financial instrument including payment terms;

          correlating the received financial instrument with the transmitted invoice in
10   accordance with the payment terms with the settlement amount; and

          transmitting the correlated financial instrument to a financial institution for affecting payment of the transmitted invoice.

According to a fourth aspect of the present invention, there is provided an electronic
15   payment server for facilitating settlement of an electronic financial instrument. The electronic payment server includes a financial instrument receiver, a settlement processor, and a transmitter. The financial instrument receiver is configured for receiving an electronic financial instrument for settlement, the financial instrument including settlement terms. The settlement processor is in communication with the
20   financial instrument receiver to obtain a validity indication of the received financial instrument. The transmitter is configured for communication with a financial institution clearance house for providing the clearance house with the settlement terms for effecting settlement.

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BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiments of the invention will now be described, by way of example only, with reference to the drawings, in which:

30   Fig. 1 is a schematic view of the electronic invoice payment system, according to a first aspect of the present invention, depicting the electronic invoice transmitter, the electronic invoice receiver, and the electronic payment processor;

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Fig. 2 is a schematic view of an electronic invoice receiving device for receiving payment for an electronic invoice over a network, according to a second aspect of the present invention, depicting the electronic invoice transmitter, the document receiver, the settlement processor, and the document transmitter;

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Fig. 3 is a schematic view of an electronic invoice payment device for paying an electronic invoice over a network, according to a third aspect of the present invention, depicting the electronic invoice receiver, the electronic payment processor, and the document transmitter; and

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Fig. 4 is a schematic view of an electronic financial instrument settlement server for facilitating settlement of an electronic financial instrument between financial institutions, according to a fourth aspect of the present invention, depicting the financial instrument receiver, the settlement preprocessor, and the financial instrument

15   transmitter.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to Fig. 1, an electronic invoice payment system, denoted generally as 100, is shown comprising a settlement processor 102, an electronic invoice transmitter

20   104, an electronic invoice receiver 106, and an electronic payment processor 108. The electronic invoice payment system 100 also includes an electronic document transmitter 110, an electronic document receiver 112, and a communications network 114 interconnecting the invoice transmitter 104, the invoice receiver 106, the document transmitter 110, and the document receiver 112 for facilitating

25   communications between the settlement processor 102 and the payment processor 108. In addition, the electronic invoice payment system 100 includes an electronic settlement transmitter 116 and a clearance processor 118 in communication over the communications network 114 for affecting settlement with a financial institution. Typically the electronic invoice payment system 100 includes a plurality of settlement

30   processors 102 (each corresponding to a supplier of goods/services) and a plurality of payment processors 108 (each corresponding to a consumer of goods/services).

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However, for clarity, only a single settlement processor 102 and a single payment processor 108 is shown.

Preferably, the communications network 114 comprises a land-based network, such as the Internet. However, the communications network 114 may instead comprise a wireless network for communication with wireless devices. Also, the present invention is not limited to the network configuration shown in Fig. 1. For instance, the communications network 114 may comprise separate networks, with the invoice transmitter 104 and the invoice receiver 106 communicating over one network, and the document transmitter 110 and the document receiver 112 communicating over a second network. This configuration may be advantageous where the invoice recipient desires to receive invoices over the Internet with a desktop computer, but also desires to pay the invoices with a hand-held wireless communications device, such as a personal data assistant (PDA). Other network configurations will be apparent to those of ordinary skill in the art.

The settlement processor 102 is configured to generate an electronic invoice which includes settlement details (eg. name of a payment recipient, a settlement amount, goods/services purchased). Typically, the settlement processor 102, the invoice transmitter 104, the document receiver 112, and the settlement transmitter 116 are provided on a single electronic communications device, such as a desktop computer. As shown in Fig. 2, the settlement processor 102 comprises a user interface 120, a central processing unit (CPU) 122 in communication with the user interface 120, and a non-volatile memory long-term storage device such as a magnetic disc (DISC) 124, and a read/write memory (RAM) 126 both in communication with the CPU 122. The user interface 120 comprises a data entry device 128, such as a keypad or a voice-recognition port, for creating the electronic invoice; and a display device 130, such as a CRT or a LCD, for viewing the electronic invoice created with the data entry device 128.

The DISC 124 includes a customer database 130 identifying a transaction between a customer and a supplier. The customer database 130 comprises a series of records,

each specifying the name of a customer, the network address of the customer, the goods or services purchased by the customer, and the amount owed by the customer. Each database record also includes an invoice number if the customer has already been invoiced. Typically, the customer database records are entered via the user

5   interface 120. As will become apparent, the settlement processor 102 uses the customer database 130 for entering the settlement details onto the electronic invoice, for directing the electronic invoice to the intended recipient, and for verifying payment of each invoice.

10   Preferably, the DISC 124 also includes a private encryption key which is uniquely associated with the user of the settlement processor 102.

In addition to the specified settlement details, preferably the electronic invoice also includes advertising materiel to advise the invoice recipient of promotions, and to

15   encourage future sales. Accordingly, preferably the DISC 124 also stores the appropriate advertising materiel for entry into the electronic invoice. Alternately, the advertising matter may be entered directly via the data entry device 128.

The RAM 126 includes processor instructions for the CPU 122, and includes a

20   memory object defining a document processor 132 for defining the electronic invoice, and a memory object defining an endorsement processor 134 for electronically endorsing a financial instrument received from the invoice recipient. It will be appreciated that the document processor 132, and the endorsement processor 134 need not be implemented as memory objects, but instead may be implemented in electronic

25   hardware, if desired.

The invoice transmitter 104 is in communication with the settlement processor 102, and is configured for receiving the electronic invoices generated by the settlement processor 102 and for electronically transmitting the invoices over the

30   communications network 114. In one variation, the network 114 comprises the Internet, in which case the invoice transmitter 104 comprises a network interface device, such as a modem or network card, for transmitting the invoice over the

Internet to the e-mail address of the intended recipient. Alternately, in another variation, the network 114 comprises a wireless network, in which case the invoice transmitter 104 comprises a wireless transmitter for transmitting the invoice over the wireless network to the wireless address of the intended recipient.

As shown in Fig. 2, the settlement processor 102 is in communication with the document receiver 112 and the settlement transmitter 116. The document receiver 112 is configured for receiving the financial instrument from the invoice recipient for ultimately effecting settlement of the invoice. In the variation where the network 114 comprises the Internet, the document receiver 112 comprises a network interface device, such as a modem or network card, for receiving the transmitted financial instrument. The settlement transmitter 116 is configured for transmitting an endorsed financial instrument from the settlement processor 102 to the clearance processor 118 for settlement between the payer's financial institution and the payee's financial institution.

The payment processor 108 is configured to generate an electronic financial instrument for payment of the electronic invoice transmitted from the invoice transmitter 104. Preferably, the invoice receiver 106, the payment processor 108, and the document transmitter 110 are provided on a single portable electronic communications device, such as a laptop computer, wireless personal data assistant or wireless telephone. As shown in Fig. 3, the payment processor 108 comprises a user interface 136, a central processing unit (CPU) 138 in communication with the user interface 136, and a programmable non-volatile memory (PROM) 140 and a read/write memory (RAM) 142 both in communication with the CPU 138. The user interface 136 comprises a data entry device 144, such as a keypad, a voice-recognition port or handwriting recognition tablet, for generating an electronic financial instrument for payment of the invoice; and a display device 146 for viewing the electronic invoice and for viewing the electronic financial instrument generated.

The PROM 140 includes a MICR record which identifies the bank account number of the user of the payment processor 108, and the financial institution routing number

associated with the user's bank account number. Preferably, the PROM 140 also
includes a private encryption key which is used by the user of the payment processor
108 for electronically endorsing the financial instrument. Preferably, the private
encryption key digital is stored in the PROM 140 via a suitable port provided in the
5   user interface 136, such as with a magnetic or SmartCard reader.

The PROM 140 also includes processor instructions for the CPU 138 which establish
in the RAM 142 a memory object defining a document processor 148, and a memory
object defining an electronic checkbook 150 for deriving the electronic financial
10   instrument from the invoice transmitted from the settlement processor 102. The
electronic checkbook 150 comprises a memory object defining an instrument
processor 152, and a memory object defining an encryption processor 154 for
electronically endorsing the electronic financial instrument with a digital signature
(derived from the user's private encryption key). It will be appreciated that the
15   document processor 148, the instrument processor 152, and the encryption processor
154 need not be implemented as memory objects, but instead may be implemented in
electronic hardware, if desired.

The payment processor 108 is in communication with the invoice receiver 106 and the
20   document transmitter 110. The invoice receiver 106 is configured for receiving the
electronic invoices transmitted from the settlement processor 102 over the
communications network 114, and for transmitting the received invoices to the
payment processor 108. The document transmitter 110 is configured for transmitting
the financial instruments provided by the payment processor 108 for effecting
25   payment of the invoice. In the variation where the network 114 comprises the
Internet, the invoice receiver 106 and the document transmitter 110 each comprise a
network interface device, such as a modem or network card, respectively for receiving
the electronic invoice transmitted over the Internet and for transmitting the financial
instrument over the Internet to the e-mail address of the payee. Alternately, in the
30   variation where the network 114 comprises a wireless network, the invoice receiver
106 and the document transmitter 110 respectively comprise a wireless receiver for
receiving the electronic invoice transmitted over the wireless network, and a wireless

transmitter for transmitting the financial instrument over the wireless network to the wireless address of the payee.

      The clearance processor 118 is configured to receive endorsed electronic financial
5   instruments and for effecting settlement of the financial instruments between the financial institutions of the payer and the payee. As shown in Fig. 4, the clearance processor 118 comprises a document transceiver 156 for receiving endorsed financial instruments from a plurality of different settlement processors 102, a document transmitter 158 for transmitting the financial instrument to a clearing institution for
10   settlement of the financial instrument, and a settlement preprocessor 160 in communication with the document transceiver 156 and the document transmitter 158 for processing of the financial instrument prior to transmission to the appropriate clearing institution.

15   The settlement preprocessor 160 comprises a central processing unit (CPU) 162, and a non-volatile memory device such as magnetic disc (DISC) 164 and a read/write memory (RAM) 166 both in communication with the CPU 162. The DISC 164 includes an institution database 168 comprising a series of records, each specifying a name of a financial institution, a financial institution routing code associated with the
20   financial institution, and a status flag indicating whether the financial institution is capable of receiving and processing electronic checks. As will be discussed below, the status flag is used by the settlement postprocessor 160 for processing endorsed electronic financial instruments from the settlement processors 102, in accordance with the ability of the payee's financial institution to process electronic financial
25   instruments of the format provided by the payment processor 108.

      Preferably, the DISC 164 also includes a certification database 170 comprising a series of records, each including the name of a payer or payee, a digital certificate uniquely associated with the payer/payee, and the name of the financial institution
30   associated with the payer/payee. Each digital certificate is digitally signed by the clearance processor 118, and includes a public encryption key which is uniquely associated with the payer/payee. The certification database 170 preferably also

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includes a record which includes a private encryption key and a corresponding public encryption key which are uniquely associated with the clearance processor 118. As will become apparent, the settlement postprocessor 160 uses the certification key database 170 to read each endorsed electronic financial instrument it receives and to

5   verify the integrity of each electronic financial instrument.

The RAM 166 includes processor instructions for the CPU 162 which establish in the RAM 166 a memory object defining a validation processor 172 for verifying the authenticity of electronic financial instruments received from the settlement

10   processors 102, and a memory object defining a check translator 174 for converting the received financial instruments to automated clearance house (ACH) payment format, if necessary. It will be appreciated that the validation processor 172 and the check translator 174 need not be implemented as memory objects, but instead may be implemented in electronic hardware, if desired.

15

In the variation where the network 114 comprises the Internet, the settlement transmitter 116 (of the settlement processor 102) and the document transmitter 158 (of the settlement postprocessor 160) each comprise a network interface device, such as a modem or network card, respectively for transmitting and for receiving the electronic

20   financial instrument over the Internet. Alternately, in the variation where the network 114 comprises a wireless network, the settlement transmitter 116 and the document transmitter 158 respectively comprise a wireless transmitter and receiver for transmitting and receiving the electronic financial instrument over the wireless network.

25

The operation of the preferred embodiment will now be described. In the preferred implementation of the invention, each settlement processor user and each payment processor user registers itself with the clearance processor 118. Upon verification of the identity of each user, the clearance processor 118 issues each user with a digital

30   certificate which includes the user's name and a public encryption key uniquely associated with the user. Each digital certificate is digitally signed with the private encryption key assigned to the clearance processor 118 so that subsequent recipients

of the encryption key can verify the validity of the user's public encryption key. The clearance processor 118 stores a copy of each digital certificate in the certification database 170. As will be apparent, each settlement processor 102 stores a copy of the private encryption key corresponding to its public encryption key in its DISC 124.

5   Similarly, each payment processor 108 stores a copy of the private encryption key corresponding to its public encryption key in its PROM 140.

After registration, a settlement processor user creates an electronic invoice for payment by an intended recipient by issuing a customer search command, through

10   their respective user interface 120, to the settlement processor 102. The document processor 132 receives the search command, and then retrieves from the customer database 130 a database record identifying a customer having an outstanding account for which no invoice has yet been generated. From the retrieved database record, the document processor 132 extracts the customer name, the e-mail address of the

15   customer, the outstanding amount, and the goods or services purchased by the customer, and then creates an electronic invoice which includes the invoice number, the customer name, the outstanding amount, the name of the payee (ie user of the settlement processor 102), the e-mail address of the payee, and a summary of the goods/services purchased. Preferably, the document processor 132 creates the

20   electronic invoice using a suitable XML-based language, such FSML.

Preferably, the settlement processor 102 queries the settlement postprocessor 160 for the digital certificate associated with the payer, and then encrypts the electronic invoice with the public encryption key included with the digital certificate. The

25   document processor 132 then attaches a copy of the digital certificate associated with the payee to allow the payer to ultimately transmit an encrypted financial instrument to the payee. However, it will be apparent that this latter step is optional since the payer may query the settlement postprocessor 160 for the public encryption key associated with the payee. Alternately, encryption of the electronic invoice and the

30   financial instrument may be dispensed with, if privacy is not a significant concern.

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The document processor 132 then fashions the encrypted electronic invoice, either as an integral part of or as an attachment to, an e-mail message having as its target network address the e-mail address of the customer. The document processor 132 then delivers the e-mail message to the invoice transmitter 104 for transmission over

5 the Internet to the customer, and enters the invoice number into the retrieved database record of the customer database 130.

The invoice receiver 106 of the payment processor 108 receives the e-mail message from the settlement processor 102, and then delivers it to the payment processor 108

10 for deriving an electronic financial instrument for payment of the invoice. The document processor 148 extracts the received electronic invoice and the return e-mail address message from the received e-mail message and then, using the private encryption key retained in the PROM 140, decrypts the electronic invoice. Preferably, each electronic invoice received is held in the RAM 142 until such time as

15 the user of the payment processor 108 issues a read command, through the data entry device 144. This procedure allows the user to delay payment of all invoices received until a convenient time.

Alternately, in one variation, the payment processor 108 notifies the user of the

20 payment processor 108 upon receipt of each e-mail message. The user may then issue a read command, via the data entry device 144, for viewing of the e-mail message. The document processor 148 receives the read command, and then extracts the electronic invoices from the received e-mail messages, as described above.

25 Upon receipt of the read command, the document processor 148 displays each electronic invoice on the display 146 of the user interface 136. The user then selects each electronic invoice to be paid, and issues an payment command to the electronic checkbook 150 via the data entry device 144 which invokes the electronic checkbook 150. From each selected electronic invoice, the instrument processor 152 of the

30 electronic checkbook 150 extracts the invoice number, the name of the payee, the e-mail address of the payee, the outstanding amount, and the digital certificate of the payee (if attached), and then creates a plurality of electronic checks each specifying

the invoice number, the name of the payer, the name of the payee and the amount owed to the payee. Preferably, each electronic check also specifies the financial institution account number and routing number associated with the payee. The instrument processor 152 then displays the electronic checks on the display 146 of the

5   user interface 136. Preferably, the instrument processor 152 creates the electronic checks using a suitable XML-based language, such FSML. US 5,677,955 describes a form of electronic check which uses FSML, and is particularly well suited for use with the present invention.

10   If the user is satisfied as to the information specified on the electronic checks, the user issues an endorsement command, via the data entry device 144, for electronically endorsing the electronic checks. The encryption processor 154 receives the endorsement command, and then creates a digital signature using the user's private encryption key. The encryption processor 154 then attaches the digital signature and a

15   copy of the digital certificate to the electronic check to allow the recipient of the electronic check to verify the integrity of the electronic check. Preferably, the encryption processor 154 then encrypts the electronic check using the public encryption key of the payee (obtained from the payee's digital certificate). The electronic checkbook 150 attaches the digitally endorsed encrypted electronic check to

20   an e-mail message having as its target network address the e-mail address of the payee. The electronic checkbook 150 then delivers the e-mail message to the document transmitter 110 for transmission over the Internet to the payee.

Preferably, each electronic check also includes a check number, and after transmission

25   of the e-mail message to the document transmitter 110, the payment processor 108 also delivers to the clearance processor 118 an encrypted e-mail message including a list of check numbers issued by the user of the payment processor 108. As will be explained below, this additional e-mail transmission provides an extra measure of security.

30

The document receiver 112 receives the e-mail message from the payment processor 108, and then delivers it to the settlement processor 102 for further processing. Upon

receipt of the e-mail message, the document processor 132 of the settlement processor 102 extracts the electronic check from the received e-mail message, and then decrypts the electronic check using the payee's private encryption key (if the electronic check was encrypted). The document processor 132 then delivers the electronic check to the

5   endorsement processor 134, which endorses the electronic check by attaching to the check a digital signature derived using the payee's private encryption key. Preferably, the endorsement processor 134 then encrypts the endorsed electronic check using the public encryption key of the clearance processor 118, attaches the encrypted electronic check to an e-mail message having as its target network address the e-mail

10   address of the clearance processor 118. The endorsement processor 134 then delivers the e-mail message to the settlement transmitter 116 for transmission over the Internet to the clearance processor 118.

       The document transceiver 156 of the clearance processor 118 receives the e-mail

15   message from the settlement processor 102, and then delivers it to the settlement preprocessor 160 for settlement. The validation processor 172 of the settlement preprocessor 160 extracts the encrypted electronic check from the e-mail message, and then decrypts the electronic check using the private encryption key assigned to the clearance processor 118. The validation processor 172 extracts the payee name, the

20   payer name and the settlement amount from the electronic check. The validation processor 172 then verifies the authenticity of the payee's digital signature by means well know to those skilled in the art, namely by extracting a hash key from the payee's digital signature using the payee's public encryption key, generating a hash key from the electronic check, and then comparing the extracted hash key with the generated

25   hash key. The validation processor 172 also verifies the authenticity of the payer's digital signature in a similar manner, but using the payer's public encryption key.

       If each electronic check includes a check number, and the payment processor 108 provided the clearance processor 118 with a list of check numbers, as described

30   above, the validation processor 172 performs an additional authenticity check by comparing the check numbers of each check bearing the payer's name with the list of

check numbers. This latter authenticity check provides an extra measure of security against tampering of the electronic checks.

5   If the validation processor 172 is able to verify the authenticity of the electronic check, the validation processor 172 passes the electronic check to the check translation processor 174. Upon receipt of the electronic check, the check translation processor 174 extracts the financial institution routing number (if present) from the check, and then queries the institution database 168 with the extracted financial institution routing number to determine whether the financial institution associated

10   with the payer is capable of processing electronic checks. If the status flag of the database record associated with the payer's financial institution indicates that the payer's financial institution is not electronic check capable, the check translation processor 174 converts the format of the electronic check to automated clearance house (ACH) format before proceeding further.

15

Alternately, in one variation, if the electronic check does not specify the financial institution account number and routing number, the check translation processor 174 determines whether the financial institution associated with the payer is capable of processing electronic checks by querying the certification database 170 with the name

20   of the payer for the name of the payer's financial institution, and then querying the institution database 168 with the extracted financial institution name.

After the electronic check has been converted to the ACH format, if necessary, the document transmitter 158 opens a secure communications line to a recognized

25   financial institution clearing house, and then transmits to the financial institution clearing house the information necessary for settlement (eg. the financial institution routing numbers, and the settlement amount). After settlement, typically the financial institution of the payee advises the payee of the deposit, thereby allowing the payee to update the records of the customer database 130.

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In one variation of the invention, if the validation processor 172 is able to verify the authenticity of both digital signatures, the validation processor 172 also extracts the

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invoice number, the payer name, and the settlement amount from the electronic check, and then transmits a confirmation message via return e-mail by the document transceiver 156 to the settlement processor 102. The document processor 130 of the settlement processor 102 compares the payer name and the settlement amount

5   specified in the confirmation message with the payer name and the outstanding amount specified on the electronic invoice (as identified in the customer database 130), and if the electronic financial instrument and the electronic invoice correlate, the document processor 130 erases the database record from the customer database. If the electronic financial instrument and the transmitted invoice do not correlate, the

10   document processor 130 removes the invoice number from the database record, and updates the outstanding amount on the database record.

The foregoing description is intended to be illustrative of the preferred embodiments of the present invention. Those of ordinary skill will envisage certain additions,

15   deletions and/or modifications to the described embodiments which, although explicitly described herein, do not depart from the scope or spirit of the invention, as defined by the claims appended hereto.

WE CLAIM:

1.   An electronic invoice payment system comprising:

        a settlement processor for providing an electronic invoice;

        an electronic invoice transmitter in communication with the settlement processor for electronically transmitting the invoice over a network;

        an electronic invoice receiver configured for receiving the transmitted electronic invoice over the network; and

        an electronic payment processor in communication with the invoice receiver for providing an electronic financial instrument for payment of the received invoice.

2.   The electronic invoice payment system according to claim 1, wherein the financial instrument comprises an electronic check, and the payment processor comprises an electronic checkbook for deriving the electronic check from the received invoice.

3.   The electronic invoice payment system according to claim 2, wherein the electronic checkbook includes an encryption processor for electronically endorsing the derived electronic check.

4.   The electronic invoice payment system according to claim 2 or 3, wherein the network comprises a wireless network, the invoice transmitter comprises a first wireless transmitter in communication with the invoice transmitter for transmitting the invoice over the wireless network, and the electronic invoice payment system further comprises a second wireless transmitter in communication with the payment processor for transmitting the electronic check over the wireless network.

5.   The electronic invoice payment system according to claim 1, further comprising a document receiver for receiving the financial instrument over the network, and a settlement processor in communication with the document receiver for affecting settlement of the invoice with the received financial instrument.

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6.   The electronic invoice payment system according to claim 5, wherein the settlement processor includes an endorsement processor for electronically endorsing the received financial instrument, and the electronic invoice payment system further comprises a document transmitter in communication with the endorsement processor for transmitting to a financial institution the endorsed financial instrument for the settlement.

7.   The electronic invoice payment system according to claim 5, wherein the financial instrument comprises an electronic check having a predefined format, and the settlement processor includes a check translator in communication with the endorsement processor for converting the financial instrument from the predefined format to an automated clearance house (ACH) payment format.

8.   The electronic invoice payment system according to claim 7, wherein the payment processor includes an encryption processor for applying a digital signature to the electronic check, the digital signature being derived from an encryption key provided from a financial institution, and the check translator is configured for converting the financial instrument in accordance with an identity of the financial institution.

9.   The electronic invoice payment system according to claim 7, wherein the settlement processor includes a database in communication with the check processor, the database including records each identifying a financial institution and an electronic check capability status of the financial institution, and the check translator is configured for converting the financial instrument in accordance with the electronic check capability status.

10.   A method for electronic invoice payment over a network, the method comprising the steps of:

        providing an electronic invoice for payment to a payment recipient, the invoice including a settlement amount;

        transmitting the invoice to a recipient network location for receipt by a target recipient;

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the target recipient deriving from the received invoice an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount; and

transmitting the financial instrument to a payment network location for settlement of the received invoice.

11.   The method according to claim 10, wherein the financial instrument comprises an electronic check, and the instrument deriving step comprises the steps of deriving the electronic check from the received invoice, and electronically endorsing the derived electronic check.

12.   The method according to claim 10, wherein the payment is settled by the steps of electronically endorsing the transmitted financial instrument at the payment network location, and transmitting the endorsed financial instrument from the payment network location to a financial institution for the settlement.

13.   The method according to claim 10, wherein the financial instrument comprises an electronic check having a predefined format, and the payment is settled by the steps of converting the financial instrument from the predefined format to an automated clearance house (ACH) payment format, and transmitting the converted financial instrument from the payment network location to a financial institution for the settlement.

14.   The method according to claim 10, wherein the financial instrument comprises an electronic check having a predefined format, the instrument deriving step comprises applying a digital signature to the electronic check, the digital signature being derived from an encryption key provided from a financial institution, and the payment is settled by the steps of, in accordance with an identity of the financial institution, converting the financial instrument from the predefined format to an automated clearance house (ACH) payment format, and providing the financial institution with the converted financial instrument for the settlement.

15.   The method according to claim 10, wherein the financial instrument comprises an electronic check having a predefined format, the instrument deriving step comprises applying a digital signature to the electronic check, the digital signature being derived from an encryption key provided from one of a plurality of financial institutions, and the payment is settled by the steps of maintaining a database including records identifying an electronic check capability status of each said financial institution, and, in accordance with the electronic check capability status of the one financial institution, converting the financial instrument from the predefined format to an automated clearance house (ACH) payment format.

16.   An electronic invoice provided for use with the method according to any of claims 10 to 15.

17.   A financial instrument provided by the method according to any of claims 10 to 15.

18.   An electronic invoice payment device for paying an electronic invoice over a network, the electronic invoice payment device comprising:

        an electronic invoice receiver configured for receiving over the network from a payment recipient an electronic invoice, the invoice including a settlement amount;

        an electronic payment processor in communication with the invoice receiver for providing an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount; and

        a document transmitter in communication with the payment processor for transmitting the financial instrument over the network for affecting payment of the received invoice.

19.   A method for paying an electronic invoice over a network, the method comprising the steps of:

        receiving over a network from a payment recipient an electronic invoice for payment, the invoice including a settlement amount;

        deriving from the received invoice an electronic financial instrument, the financial instrument being derived in accordance with the settlement amount; and

transmitting over the network to the payment recipient the financial instrument for settlement of the received invoice.

20.   An electronic payment device for receiving payment over a network payment for an electronic invoice, the electronic payment receiving device comprising: ·

an electronic invoice transmitter for transmitting over the network to a target recipient an electronic invoice, the invoice including a settlement amount;

a document receiver for receiving over the network from the target recipient an electronic financial instrument, the financial instrument including payment terms;

a settlement processor in communication with the invoice transmitter and the document receiver for providing the invoice transmitter with the invoice and for correlating the received financial instrument with the transmitted invoice; and

a document transmitter in communication with the settlement processor for transmitting the correlated financial instrument to a financial institution for affecting payment of the transmitted invoice.

21.   A method for obtaining payment over a network for an electronic invoice, the method comprising the steps of:

transmitting over a network to a target recipient an electronic invoice for payment, the invoice including a settlement amount;

receiving over the network from the target recipient for settlement of the payment an electronic financial instrument, the financial instrument including payment terms;

correlating the received financial instrument with the transmitted invoice in accordance with the payment terms with the settlement amount; and

transmitting the correlated financial instrument to a financial institution for affecting payment of the transmitted invoice.

22.   An electronic payment server for facilitating settlement of an electronic financial instrument, comprising:

a financial instrument receiver for receiving an electronic financial instrument for settlement, the financial instrument including settlement terms;

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a settlement processor in communication with the financial instrument receiver for obtaining a validity indication of the received financial instrument; and

a transmitter configured for communication with a financial institution clearance house for providing the clearance house with the settlement terms for effecting the settlement.

23.   The electronic payment server according to claim 22, wherein the financial instrument includes an electronic signature, and the settlement processor includes a certification database comprising records identifying registered users, each said record specifying an identity of one of the registered users and a digital certificate associated with the one registered user, and a validation processor in communication with the certification database for providing the validation indication in accordance with a correspondence between the electronic signature and one of the digital certificates.
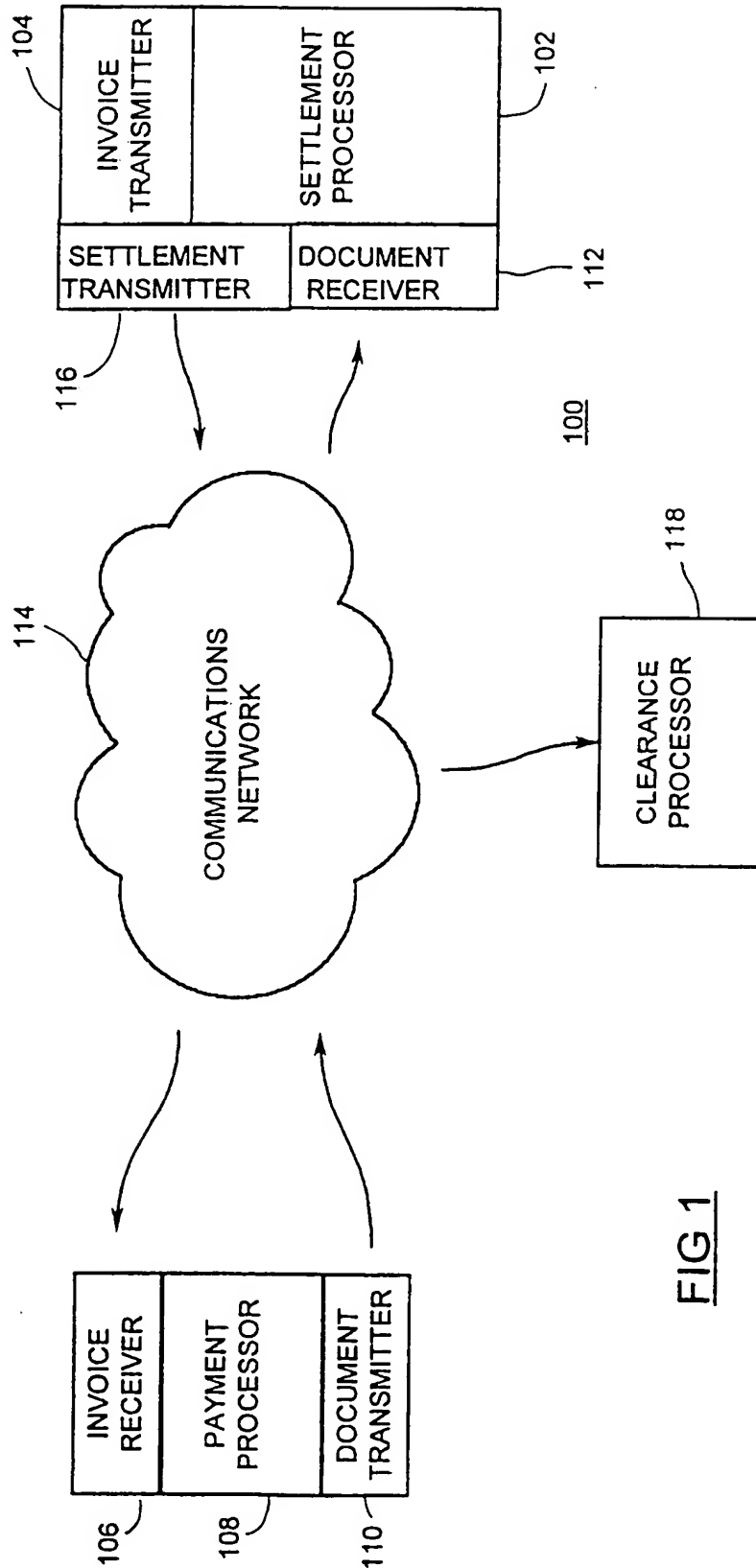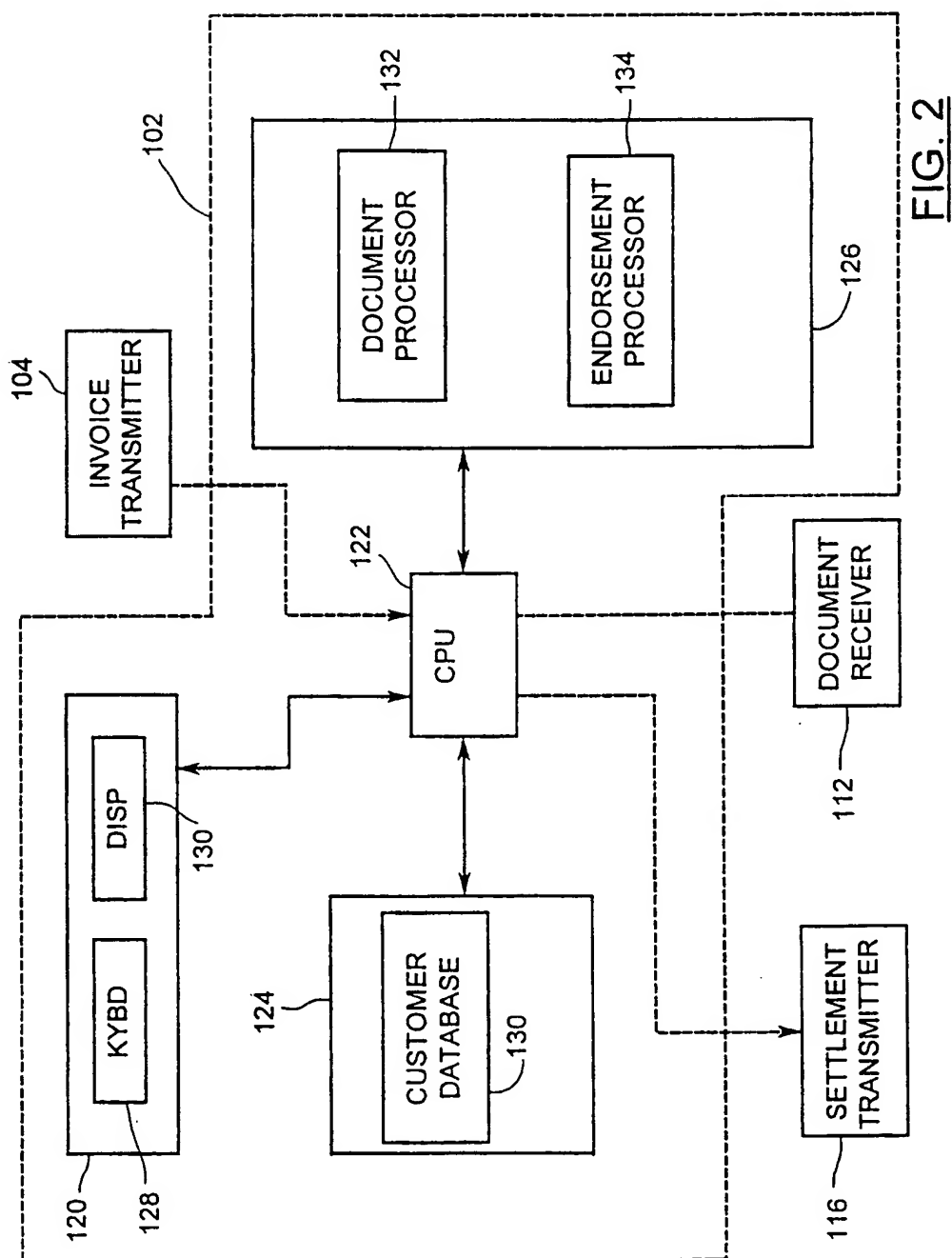
1/4

SETTLEMENT
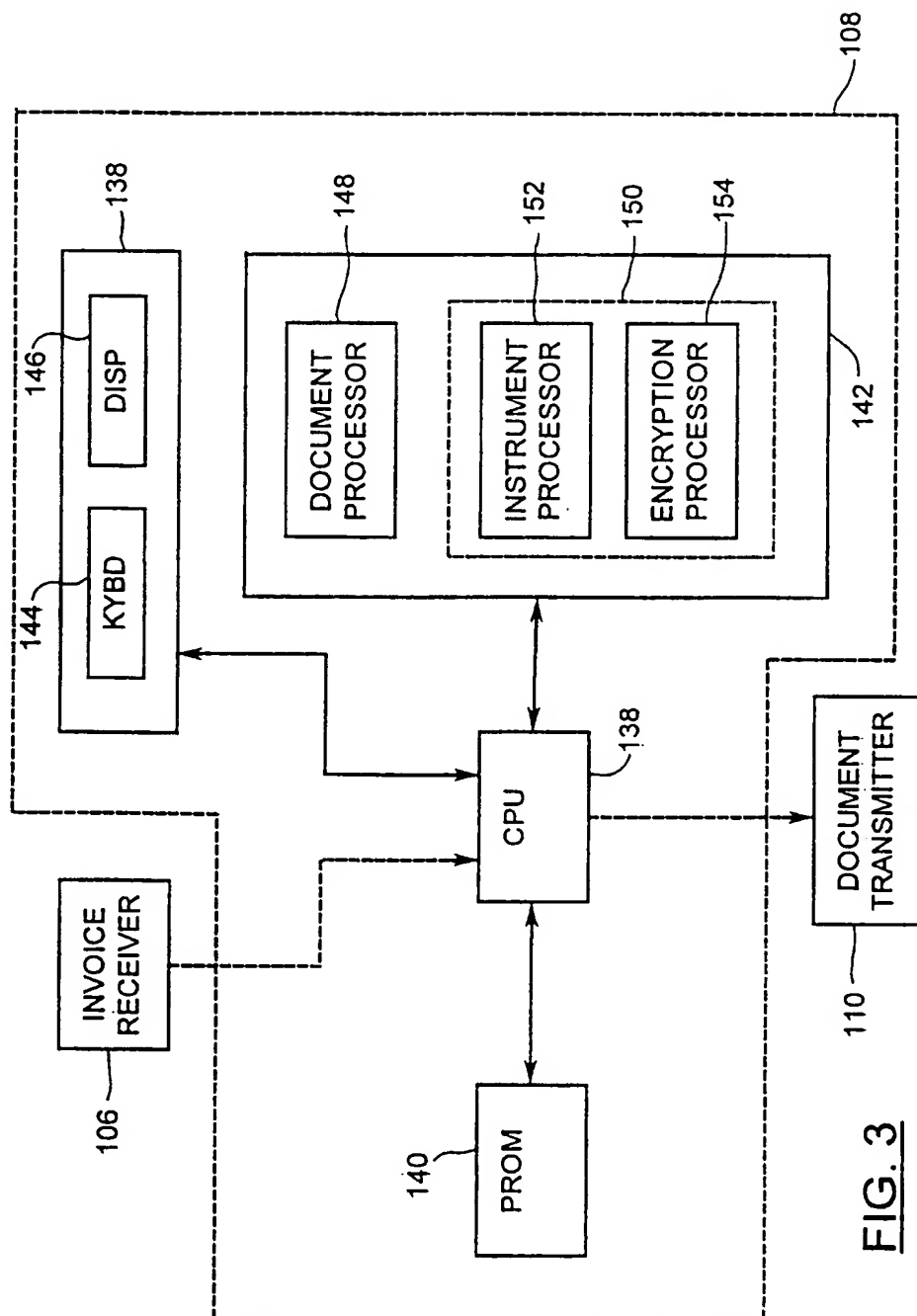PROCESSOR

INVOICE
TRANSMITTER

104

102

SETTLEMENT
TRANSMITTER

DOCUMENT
RECEIVER

116

112

100

COMMUNICATIONS
NETWORK

114

CLEARANCE
PROCESSOR

118

INVOICE
RECEIVER

PAYMENT
PROCESSOR

DOCUMENT
TRANSMITTER

106

108

110

<u>FIG 1</u>

FIG. 2

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FIG. 3

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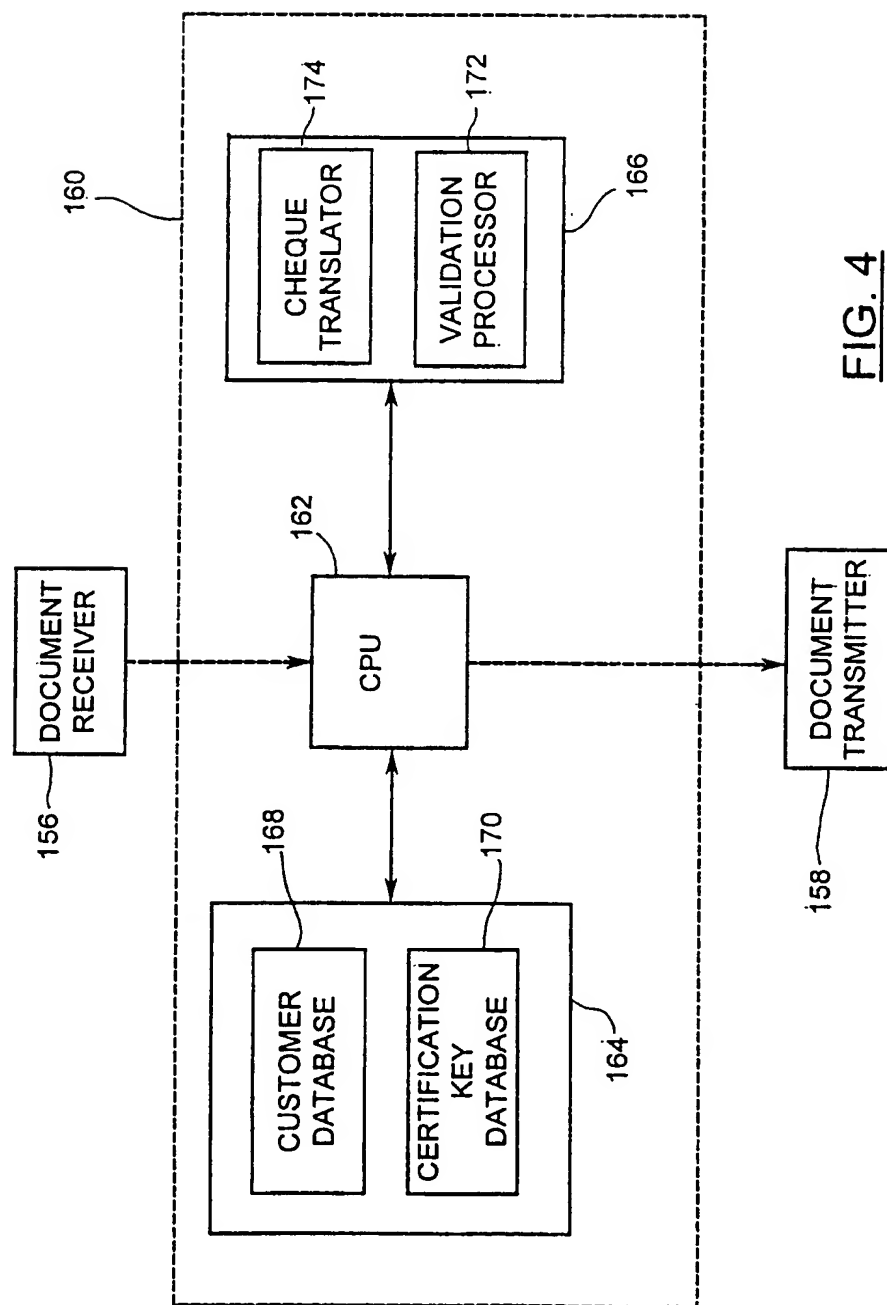
FIG. 4

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06F17/60   G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G06F   G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 13422 A (NEELY R ALAN) 18 March 1999 (1999-03-18) abstract page 15, line 1 - line 5; figure 3B page 13, line 35 -page 14, line 13 page 13, line 25 - line 29 page 12, line 14 -page 13, line 11 page 7, line 17 - line 24 page 6, line 30 - line 35 page 4, line 2 - line 29 --- -/--	1-23

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2000	31/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Wauters, J

INTERNATIONAL SEARCH REPORT

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
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